

**WHAT IS CLAIMED IS:**

1. A cartridge having a chamber to hold a recording material used for printing therein, said cartridge being mounted on a 5 printing apparatus, said cartridge comprising:

a sensor that detects a state of the recording material held in the chamber;

a condition reception module that receives an externally specified detection condition of said sensor;

10 a detection module that carries out the detection under the specified detection condition; and

an output module that outputs a result of the detection.

2. A cartridge in accordance with claim 1, wherein said output 15 module outputs data corresponding to the specified detection condition, together with the result of the detection.

3. A cartridge in accordance with claim 1, wherein the recording material is an ink of a predetermined color.

20 4. A cartridge in accordance with claim 1, wherein the recording material is a toner for any one of a photocopier, a facsimile, and a laser printer.

25 5. A cartridge in accordance with claim 1, wherein said sensor detects presence or absence of the recording material in the chamber.

6. A cartridge in accordance with claim 1, wherein said sensor measures at least one of a temperature, a viscosity, a humidity, a particle size, a hue, a remaining quantity, and a pressure of  
5 the recording material.

7. A cartridge in accordance with claim 1, wherein said output module outputs the result of the detection by radio communication.

10 8. A cartridge in accordance with claim 1, wherein said sensor is a piezoelectric element that has a varying resonance state with a variation in state of the recording material, and  
said detection module applies an excitation pulse to said piezoelectric element and measures a vibration of said  
15 piezoelectric element in response to the excitation pulse.

20 9. A cartridge in accordance with claim 8, wherein said detection module detects a resonance frequency of said piezoelectric element as a time required for at least one vibration of said piezoelectric element.

25 10. A cartridge in accordance with claim 9, wherein said condition reception module receives specification of a number of vibrations, which is used as a criterion to measure the time required for the vibration of said piezoelectric element, and  
said detection module measures a time required for the specified number of vibrations, and outputs vibration-related data

used for the measurement, together with the measured time.

11. A cartridge in accordance with claim 10, wherein the number of vibrations received by said condition reception module is  
5 specified by a position of a starting vibration, on which the measurement starts, and a position of a terminating vibration, on which the measurement ends, and

10 said detection module determines the vibration-related data, based on the position of the starting vibration and the position of the terminating vibration.

12. A cartridge in accordance with claim 1, said cartridge further comprising:

15 a memory that stores a parameter corresponding to the state of the recording material held in the chamber.

13. A cartridge in accordance with claim 1, said cartridge further comprising:

20 a radio communication module that transmits data to and from an outside by radio communication,

wherein said cartridge receives the externally specified detection condition from the outside via said radio communication module.

25 14. A cartridge in accordance with claim 13, wherein said radio communication module has a loop antenna for the communication, and comprises a power supply module that utilizes an electromotive

force induced in said antenna to supply electric power into said cartridge.

15. A printing apparatus with a cartridge mounted thereon,  
5 said cartridge having a chamber to hold a recording material used  
for printing therein, said cartridge comprising:

a sensor that detects a state of the recording material held  
in the chamber;

10 a condition reception module that receives an externally  
specified detection condition of said sensor;

a detection module that carries out the detection under the  
specified detection condition; and

an output module that outputs a result of the detection,  
said printing apparatus further comprising:

15 a condition specification module that specifies the detection  
condition;

an input module that receives the result of the detection  
output from said output module of said cartridge; and

20 a verification module that verifies the result of the  
detection.

16. A printing apparatus in accordance with claim 15, wherein  
said output module of said cartridge outputs data corresponding  
to the specified detection condition, together with the result  
25 of the detection,

said input module of said printing apparatus receives the  
output data, together with the result of the detection output from

said output module of said cartridge, and

    said verification module of said printing apparatus compares  
    the input data with the detection condition specified by said  
    condition specification module, verifies validity of the detection  
5    result in the case of correspondency of the input data to the  
    specified detection condition, and carries out a preset series  
    of processing relating to the state of the recording material.

17. A printing apparatus in accordance with claim 16, wherein  
10    said verification module comprises means that, in the case of no  
    correspondency of the input data to the detection condition  
    specified by said condition specification module, notifies the  
    non-correspondency.

15    18. A method of transmitting information to and from a  
    cartridge, which has a chamber to hold a recording material used  
    for printing therein, said information transmission method  
    comprising the steps of:

    externally specifying a detection condition of a sensor,  
20    which is mounted on said cartridge and is used to detect a state  
    of the recording material held in the chamber, from an outside  
    of said cartridge; and

    making a result of detection, which is carried out in said  
    cartridge by said sensor under the specified detection condition,  
25    output from said cartridge to the outside that has given the external  
    specification.

19. A method of transmitting information to and from a cartridge, which has a chamber to hold a recording material used for printing therein, said information transmission method comprising the steps of:

5       externally specifying a detection condition of a sensor, which is mounted on said cartridge and is used to detect a state of the recording material held in the chamber, from an outside of said cartridge;

10      making data corresponding to the specified detection condition, together with a result of detection carried out in said cartridge by said sensor under the specified detection condition, output from said cartridge to the outside of said cartridge; and

15      verifying a correspondency of the output data to the specified detection condition, so as determine validity of the detection result.